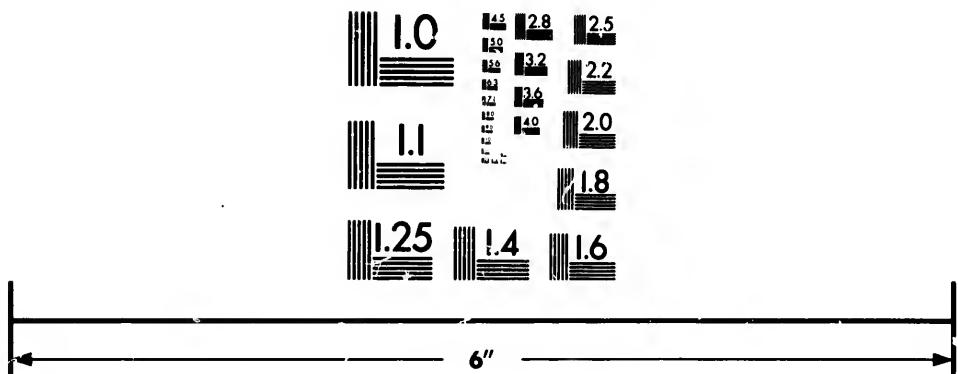


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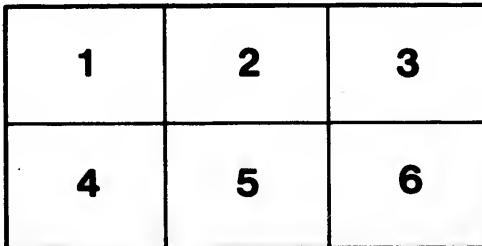
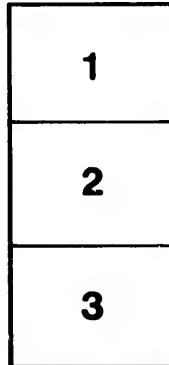
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*Professor D. Wilson F.R.S.
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THE BRITISH ASSOCIATION IN CANADA TORONTO PUBLIC LIBRARY

A PAPER READ BEFORE THE FELLOWS OF

The Royal Colonial Institute,

JANUARY 18, 1885,

WITH THE DISCUSSION.

THE RIGHT HON. THE MARQUIS OF LORNE, K.T., G.C.M.G.,
IN THE CHAIR.

BY

GENERAL SIR J. HENRY LEFROY,
K.C.M.G., C.B., F.R.S.

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London:

UNWIN BROTHERS, PRINTERS, 71A, LUDGATE HILL, E.C.

1885.

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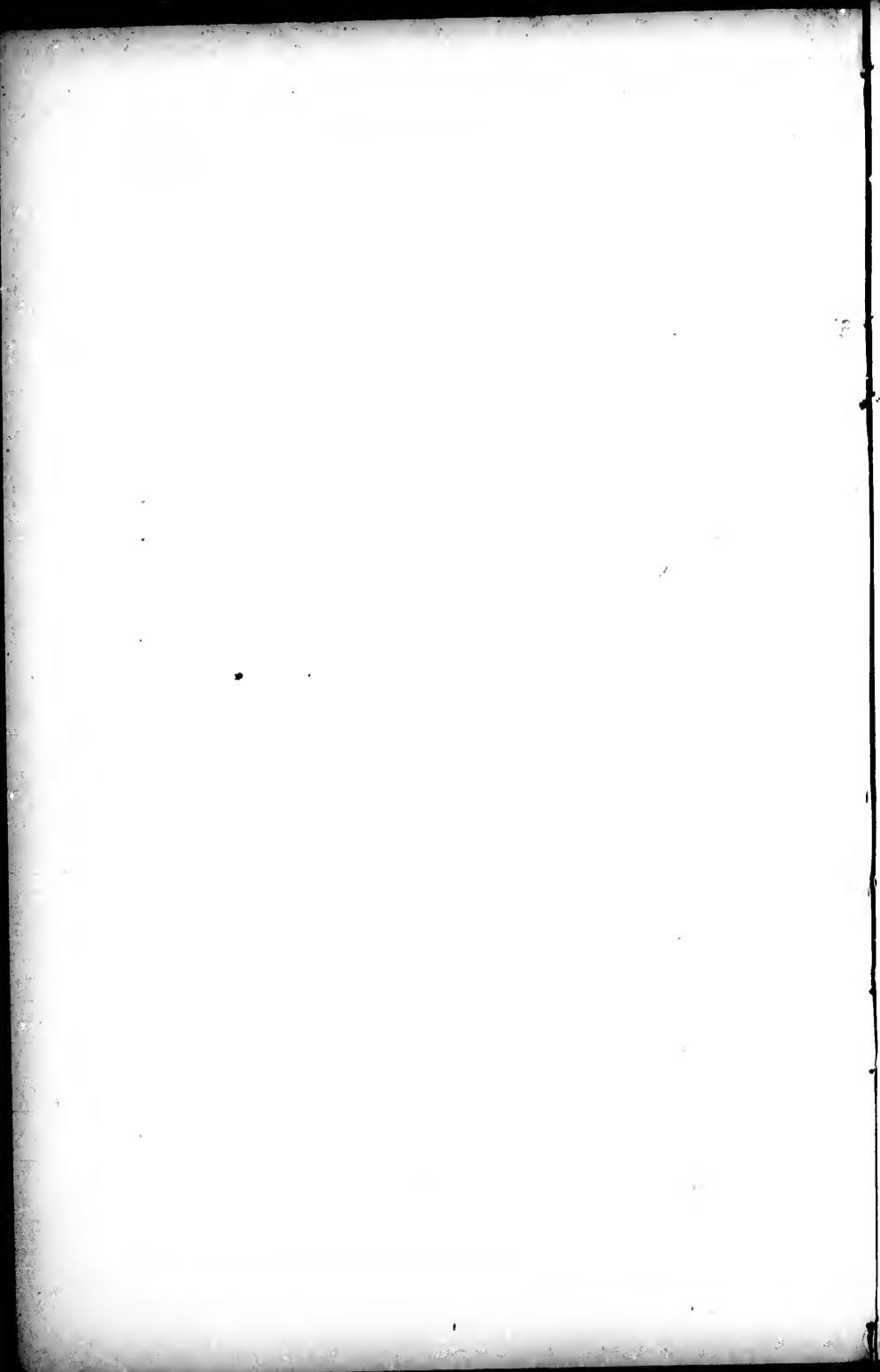
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1885.



THE BRITISH ASSOCIATION IN CANADA.

THE visit of the British Association for the Advancement of Science to Montreal last autumn was much more than a startling innovation upon the habits of an organisation supposed to be attached to these Islands by a law of its nature ; it was a surprising testimony to the social and political change that has come over the British Empire within the quarter of a century ; it is an evidence of a facility of communication undreamed of but a few years ago ; and it bespeaks the existence of a culture, an opulence, and a friendly feeling toward the Mother Country which might have been sought in vain beyond the Atlantic within a period which the memory of most of us can span. It was a memorable event in British colonial history, however it may be overshadowed for the moment by the more urgent questions of confederation and colonial defence. The Council of this Institute, in its Annual Report of June last, adverted to it with satisfaction, and some account of its inception, execution, and results cannot, I think, but be interesting to those members who, not being also members of the British Association, may never see the volume of its proceedings, which will, in due time, appear, and, if residents in a Colony, may have had but imperfect accounts of them in their local newspapers. I have not been able to identify, even with the kind assistance of Mr. O'Halloran who was present, the names of more than eleven or twelve members of this Institute who personally participated in the pleasure, the interest, and the instruction enjoyed by those who availed themselves of Canadian hospitality ; there may have been a few more, but a cursory comparison of lists is enough to show, as, indeed, would be anticipated, that the Royal Colonial

Institute and the British Association are so far dissimilar in their constitution as to warrant an assumption that a narrative of the proceedings of the one may have a character of novelty to a large proportion of the members of the other.

It was at the meeting of the British Association at York, in August, 1881, under the presidency of Sir John Lubbock, Bart., that Captain Bedford Pim, R.N., first gave form and substance to the novel idea of holding a meeting out of the United Kingdom, by notice that at the next ensuing annual assembly of the General Committee, he should move that the Association meet at Montreal in 1885. Before this official year expired, however, that is to say, in March, 1882, the Council received an invitation addressed by the Marquis of Lorne, then Governor-General, to the late Mr. Spottiswoode, President of the Royal Society, that the British Association should hold its meeting for the year 1883 in Canada, and in reply expressed regret that arrangements had already been made for the meeting of 1883, which could not be altered, but that the question of meeting in Canada on some future occasion should be brought before the General Committee in the following August. Before this date arrived the Council, having good reason to believe that the invitation would be renewed, perhaps, with the substitution of 1884 for 1883, took the precaution of sounding the members of the General Committee, who were about 700 in number, as to their views. They received 230 replies, of which 156 were in the negative; nevertheless, when the subject was again placed before that body, at Southampton, in August, 1882, a majority, led by Captain Bedford Pim, was found to be in favour of the measure, and, although a memorial against the decision was presented to the Council in February, 1884, that body decided that, as the decision of the general meeting at Southampton did not appear to be in contravention of the laws of the Association, it was not competent to them to re-open the question; moreover, they had already taken steps to ascertain the conditions of the proffered hospitality and the number of members who might be disposed to take advantage of it. On November 28, 1882, a letter was addressed to Sir A. T. Galt, G.C.M.G., the High Commissioner, putting a number of home questions on points upon which it was essential that there should be no misunderstanding. To these questions Sir Alex. Galt replied on March 3, 1883, after communication with the Chairman of the Montreal Invitation Committee, Professor T. Sterry Hunt, F.R.S. The reply was entirely

satisfactory, and on March 19, 1883, a circular was addressed to every member of the Association, conveying all needful information, and requesting a statement of intention to be present at Montreal or otherwise.

By these cautious proceedings, the Council were enabled, in their Report for the year 1882-3, to make the following announcement :—

"The Council have appointed a committee to co-operate with them for the purpose of considering the arrangements for the meeting at Montreal.

"In respect to this meeting the Council have to inform the Association, that of those who were members at the time of the meeting at Southampton (August, 1882) 445 have notified their intention to be present at the meeting in Montreal, and 55 persons have either become members, or expressed their wish to become members, with a view to taking part in this meeting. Negotiations with respect to the arrangements for the meeting on the basis of the letter from Sir A. T. Galt, dated March 3, 1883, are still proceeding (September), and for some little time it will not be possible for the Council to communicate the precise details to the members of the Association, but the following points may be regarded as settled. There will be a reduction of fares on the part of the steamship companies to all members of the Association, and a further reduction in consequence of the Canadian subsidy, at any rate, to all who were members of the meeting of 1882; and there will be an excursion after the meeting—free of cost to members as regards transit—one to the Rocky Mountains, lasting from twelve to fourteen days; another to the Falls of Niagara, and Chicago, with probably one or two shorter excursions."

The Council further reported their opinion, that as there was likely to be so representative a gathering of British members at Montreal, and as 154 members of the General Committee had signified their intention of being present, little alteration would be necessary in the custom, and no changes need be proposed in the written law of the Association.

Of the enormous labour devolved upon the officers of the Association, and more particularly upon the secretary, Professor T. G. Bonney, F.R.S., by the multifarious new arrangements, and the immense correspondence in which they had to embark, this,

perhaps, is not the occasion to enlarge; but it must ever be borne in mind that without organising ability of a high order, and indefatigable exertions in London and Montreal, it would have been impossible to bring this undertaking to a successful issue. It seems invidious to name individuals where so many co-operated, but it is impossible to omit acknowledgment of the obligations of the Association to the practical ability, tact, and influence of Sir W. Dawson, which pervaded and quietly guided everything; and I cannot forbear mentioning the invaluable services of Mr. David A. P. Watt, the secretary of the local executive committee, and of Mr. Hugh McLennan, Chairman, and Mr. J. D. Crawford, general secretary to the citizens' executive committee, as especially prominent, and of Professors Bovey and McLeod in other capacities.

The Dominion Parliament voted \$25,000 towards the expenses of the meeting, to which sum large additions were made by the contributions of citizens. \$20,000 were assigned to the reduction of ocean passages and travelling expenses; the remainder went in aid of the expenses of the Montreal Committee. Of the former sum there is a surplus of about \$2,000. Fifty persons, officers of the Association, received vouchers for the sum of £28 2s. (\$112), which was the medium price of a return ticket by the Allan line, and which was taken in part payment for passage by any of the lines. Old members received vouchers entitling the companies presenting them to receive £8 for each passage, out of the subsidy granted by the Dominion Government. The Allan Company made besides an abatement of £3 8s. on their ordinary charge for the return ticket. Nearly all the companies made a substantial reduction, usually about 10 per cent. The benefit of these arrangements was liberally extended to a number, not exceeding three, of near relations of members who might, under ordinary circumstances, share his holiday. These persons generally became associates for the occasion, and paid the usual fee of £1 to the funds.

The \$5,000 allotted by the Government to the expenses of the Montreal Committee was supplemented by a grant of the like amount from the City Council of Montreal, and by subscriptions amounting to \$10,000 from the citizens; one-half of which, however, was regarded as a guarantee fund, of which no part will be called for. A sum of \$15,000, contributed in equal proportions by the Government, the City Council, and by private persons, proved amply sufficient for all the requirements of the Committee, including

the publication in book form of the Canadian papers, and will, indeed, leave a balance to be applied to some other public purpose. The provincial capitals—Quebec, Toronto, and the political capital, Ottawa—met the expenses of their hospitalities from civic funds and private contributions, without Government aid.*

“There is nothing succeeds like success.” The complete success of the measure when fairly taken in hand is an ample justification of the boldness of the proposal, and of the activity with which the gallant officer I have already named exerted himself to secure the vote of a majority of the General Committee. It was, as already observed, a triumph of good organisation; and to the cordial co-operation of the High Commissioner, Sir Alexander Galt, afterwards of Sir Charles Tupper, and of Mr. J. G. Colmer, must be ascribed much of the credit.

I have been favoured by the various steamship companies with the information from which the following table is compiled:—

TABLE I.

Number of Members and Associate Members of the British Association conveyed to America by various lines of steamers upon the reduced terms arranged with the Council, so far as traced, from June 15 to August 16, 1884.

	Out.	Return.	
Allan Line	450	100	
Anchor Line	20	—	
Beaver Line	50	—	
Cunard Line	100	—	
Dominion Line	71	67	
Guion Line	—	—	No account kept.
Inman Line.....	20	12	
National Line.....	4	—	At least, account imperfect.
White Star Line	32	—	

We have thus accounted for 747 passengers, including the families, and, in a few instances, domestic servants of members of the Association, who availed themselves of the opportunity to visit America, in the vast majority of cases for the first time.

On the other side active preparations were made for the reception of the expected scientific visitors. Five local secretaries and a local

* The above paragraph has been somewhat extended since delivery upon information kindly furnished by Sir John A. Macdonald, through Mr. D. A. P. Watt, which had not arrived when the paper was read.

treasurer were appointed, a strong local executive committee was formed under the presidency of his Worship the Mayor of Montreal, with Professor Bovey as secretary. Local officers were appointed to each section as vice-presidents and secretaries to correspond with the officers in England, and a citizens' executive committee, divided into many sub-committees, each with its chairman and secretary, took charge of the arrangements for reception, hospitality, hotels and lodging, conveyance, printing, finance, and economics. Of the precise functions of the last section I am in doubt. There was little evidence of economy in any part of the programme.

Quite beside all these arrangements, there was a great work necessary to prepare McGill College to be the headquarters of the Association during its stay, and the place of meeting of all the sections but two. No less than twenty-nine rooms in the College, or its associated institutions, the Presbyterian College, the Wesleyan College, and the Congregational College, which form one group with it, were, more or less, cleared of their usual furniture and prepared for temporary uses. The labour and inconvenience involved in this transformation can hardly be described by any but those who carried it out.

To those who are not acquainted with Montreal it may be necessary to say that McGill University—founded in 1811 by the wealthy and patriotic citizen of Montreal whose name it bears, but first chartered in 1821,—occupies a commanding and beautiful situation on the southern slope of the mountain, about 250 ft. above the St. Lawrence. The grounds are over twenty acres in extent, much resorted to by the citizens, and it added no little pleasure to the daily routine of the meeting to enter their cool shades from the streets, and enjoy the free and park-like retirement they afforded. Great additions have been made to the university buildings by the erection of the William Molson wing, with museum rooms, chemical laboratory, and class rooms, in 1861, and the Peter Redpath Museum in 1880, both named after their munificent founders. It has received, chiefly within thirty years, in the form of endowments for special purposes (exclusive of the Founder's bequest of £10,000), sums amounting to no less than £70,000, and I find under the head of recent subscriptions for special purposes, too numerous to mention, an amount of about £12,500. These figures will suffice to convey to the members of this Institute a just impression as to the scale of the college, and also evidence that private munificence in the endowment of higher education, of which we have had such conspicuous

examples in the United States and in Australia, has not been wanting in British America.

I had the good fortune to secure passages, on August 16, in the magnificent steamer of the Allan Line, the *Parisian*. This voyage was an extra service, which under no circumstances would have been thought of but for the desire of Messrs. Allan to provide suitable conveyance for the members of the Association. It was a sailing altogether beyond their mail contract, and I regret to add that the receipts fell far short of the expenditure. It marks in a conspicuous manner the generous enthusiasm with which the business community of the Dominion, no less than the representatives of science, threw themselves into the spirit of the occasion, and contributed to its success. The *Parisian* was thought worthy to carry Cæsar and his fortunes, and any disaster to her would have certainly altered the destinies of the meeting, for among her passengers were the distinguished President of the meeting, Lord Rayleigh, one of the General Secretaries, the Treasurer, the Presidents of the Mechanical and Geographical Sections, and some seven or eight of the vice-presidents and secretaries of sections, besides a brilliant contingent of members, associates, and others, to the number of 185.

It is needless to dwell on the incidents of the voyage, which differed from others only in being more agreeable, and perhaps in the unusual number of icebergs which welcomed us to the Gulf of St. Lawrence. Point Levis was reached at 8 a.m. on the morning of Monday, August 25, some hours' delay having occurred at the bar. We were spared Custom House formalities, and joyfully bade adieu to the *Parisian*, but not before her passengers, by the voice of Lord Rayleigh, had expressed to Captain Wylie their grateful sense of his unremitting attention and of his professional skill. The *Polyneſian* and *Oregon*, which left a day or two before us, had preceded us in arrival by about the same intervals.

I cannot pass over the two days which had still to intervene before the opening of the meeting at Montreal, without a grateful allusion to the genial hospitality I found prepared for myself and family at the picturesque residence of the President of the Geographical Society of Canada, Colonel Rhodes, of which we gladly availed ourselves. If impatience to reach Montreal led most of the new arrivals to make but little stay in Quebec on this occasion, it was from no want of kindly pressure to do so.

We had, on Sunday, at Rimouski, the first exemplification of

what was a remarkable feature in the Canadian reception, I mean the liberality with which guide-books, maps, departmental documents, and the like, were presented to all who wished to have them, contrasting strongly with the morbid dread of abuse and narrowness of economy, which in this country limits the usefulness of public documents. The secretary of the Citizens' Committee, who boarded us at Rimouski, brought with him a large parcel of handbooks to the Dominion of Canada, an 8vo. volume of 885 pages, expressly prepared for the meeting by Mr. S. E. Dawson, one of the local secretaries, and these were freely given away. A descriptive sketch of the Physical Geography and Geology of the Dominion, by Dr. Selwyn and Mr. G. M. Dawson, was with equal liberality distributed to those interested. We were permitted to send or receive local telegraphic and telephone messages free of charge; each member had the privilege of sending and receiving two Transatlantic code messages free. Free railroad passes were available under intelligible and simple regulations for the protection of the companies, to every part of Canada, and tickets at half price to all parts of the Northern United States. Such is the large conception of international hospitality which pervades the American mind and penetrates American bureaux.

The changes in Quebec since my first visit to that city in 1842 were striking enough, and not wholly for the better. Then it was the seat of an immense timber trade, and resounded with the din of wooden shipbuilding. The grey walls were alive with a strong British garrison. The French population, while it dwelt much apart, was upon friendly terms with their former conquerors. Now its trade has left, or is leaving it, to a great degree as a natural consequence of the completion of the ship channel to Quebec and Montreal. This great work, which rivals in magnitude the improvements of the Clyde, enables ships drawing 27 ft. of water to go on to the latter city, and makes it the real head of the navigation. The English population, by far the most energetic, is rather diminishing than increasing, and a spirit of national rivalry has been engendered. The defences which, by a military fiction, somewhat like that of the importance of Berwick-upon-Tweed, are still supposed to constitute a first-class fortress, are in some places, at least, much in the way of improvement, and the source of great, and I am inclined to think unprofitable, expenditure in repairs. There are undoubtedly portions of the old works which can be of no

possible future use, the military conditions of real defence having entirely altered, and it seems time to review the situation. As "the spider spins her web in the palaces of Afasiaib," so grass-grown parades, deserted barracks, untenanted sentry-boxes, bespeak a life departed, and impotent old smooth-bored guns threaten where they cannot bite. I found the spot where forty-two years before I had observed the magnetic dip and terrestrial magnetic force, at an angle of the Lines, near McMahon-street, unaltered, save only that silence brooded over the former Artillery barracks, and a dynamo-machine, which would have played the mischief with my needle, was within a few yards of the spot, employed in the electric lighting of the St. Louis Hotel. On the other hand, it is needless to say that there has been a vast expansion of the city, especially conspicuous in the suburbs of St. Charles and Point Levis. At the latter, great docks are in construction, and the curious circumstance was related, that in the course of their dredging operations, a nest of anchors and chain cables were found, so hopelessly entangled, that it had to be raised *en masse*, and proved to be composed of no less than 84 anchors, and 8,000 yards of chain cable. Quebec was the mark of an excursion on August 30, when the Association was entertained by the Mayor and Corporation at lunch; an afternoon reception was held by the Lieutenant-Governor, at Spencer Wood, and a great evening reception, marred, however, by heavy rain, which quenched the intended illuminations, was held by their Excellencies the Governor-General and Lady Lansdowne, at the Citadel. It was a long and certainly fatiguing day, for which the weather was unpropitious, but the general spirit of enjoyment and the occasional glimpses afforded to the beauty of this historic city and its surroundings, left no room for regret to any who took part in the excursion. I cannot resist here paying a tribute of admiration to the inexhaustible good-humour and courtesy of Professor H. T. Bovey, who conducted it.

Quebec is not associated with pleasant recollections in the mind of all who saw it for the first time last year. An accident which might have been serious and was, in fact, very inconvenient, occurred to the steamer *Saguenay*, by which some of the members of the Association had taken passage to Tadousac, on September 25. In some manner unexplained she took fire while lying at night at the wharf at Murray Bay, and was set adrift before her passengers had all been rescued. There was great alarm; those

in the stern part of the vessel, being cut off by the flames, were in imminent danger of being burnt or drowned, when they were rescued by M. St. Onge, the purser (whose presence of mind was warmly acknowledged), and escaped with the loss of their baggage.

The British Association welcomes support from every quarter; the actual cultivation of any branch of science is not a condition of membership. It may naturally therefore be asked, and indeed has been asked, what proportion of the 553 old members who followed its standard across the Atlantic could be considered fairly to represent the scientific life of the Mother Country. To this it may be replied that among the officers alone there were the holders of six Royal medals and two Copley gold medals of the Royal Society. There were the presidents of the Geological Society, the London Mathematical Society, and the Photographical Society. There were many distinguished Professors from Cambridge, Oxford, Dublin, Glasgow, Manchester, and other Universities. There were more than twenty gentlemen who had contributed papers to the Philosophical Transactions, and contributors innumerable to the Transactions of other societies than the Royal, and workers in every field of scientific activity. Sir W. Dawson himself is the author of numerous papers in the Transactions of learned Societies. They were joined by a host, which I have counted up to seventy, of gentlemen filling professorial chairs in Canada or the United States, some of them like Professor S. Newcomb, F.R.S. (of Washington), Professor Asa Gray, F.R.S., Professor Sterry Hunt, F.R.S., Sir William Dawson, F.R.S., Dr. A. Selwyn, F.R.S., men of European reputation, many of them honourably distinguished at English Universities.

The meeting even from the British side was in fact a strong one, and entirely refuted an apprehension that for a moment prevailed, that a sufficient number of persons could not be found to face the dreaded Atlantic voyage, and to give up two months of their time to represent British science in an adequate manner. As reinforced from the American continent, it will be distinguished in the records of the Association.

It would take a more lively pen than I can command to describe the pleasant excitement and the friendly greetings of the reception rooms at McGill College, the inexhaustible courtesy and good-humour of the officers appointed to answer inquiries and to direct the visitors. About 140 residents of Montreal opened their houses to guests, receiving from two to six each; the rest dispersed them-

selves through the various hotels and lodging-houses. The Windsor Hotel, which is the largest in Canada and one of the finest in America, received the lion's share. The serious business began with an eloquent welcome from Lord Lansdowne, and the delivery of the President's address at the Queen's Hall on Wednesday evening to an audience estimated at 2,000 persons. It included the Governor-General, Lady Lansdowne, the Ladies Rayleigh, the Earl of Rosse, and many other eminent persons, and was, of course, composed not only of the members and associate-members, but of as many as could find places of the residents and their families. The President was supported by ten or eleven Vice-Presidents, among whom were the Marquis of Lansdowne himself, Sir John Macdonald, Sir Lyon Playfair, M.P., Chief Justice Sir A. Dorion, the Hon. Dr. Chauveau, and other distinguished names. The occasion was happily chosen by His Excellency to make public announcement of the honour of knighthood recently conferred by Her Majesty on Principal (now Sir William) Dawson.

I trust my audience will not be disappointed if I deal little in superlatives of description, and decline the unequal task of trying to rival the newspapers in their graphic descriptions of successive scenes that left deep impressions upon those who witnessed or took a part in them. Still less do I pretend to criticise the intellectual or scientific outcome of the meeting. The brilliant discourse of Lord Rayleigh and the addresses of the Presidents of sections were republished in the *Times* and other papers; many of them will be found at large in *Nature* and other literary periodicals easily consulted. It would be impossible to do them justice in such extracts as the limits of this paper might permit. The papers read have not as yet been published, except, perhaps, a few of them in the Proceedings of Societies; the newspaper extracts that appeared were not in general very full. It is intended, I understand, to print them at length in Canada, in a separate volume. All I shall therefore attempt is to give an abstract showing the success of the meeting in eliciting local contributions, which, after all, I presume to be what the Royal Colonial Institute will think of most. I desire, however, to make a grateful acknowledgment of the services rendered by the Montreal daily press, especially the *Montreal Gazette*. The *Montreal Star*, a paper published at one cent, actually gave its readers really excellent likenesses from photographs (by the photo-electrotype process) of the most prominent members.

There were read in the several sections the following numbers of papers and reports, those which were contributed by old members of the Association, or associates known to me as having come out from England, being distinguished from those by local scientists, in which number I include visitors from the United States :—

TABLE II.

Section.	Old Members.	Local Members.	
		Canad.-American	
A Mathematical and Physical Science ..	48	4	2
B Chemical Science	25	3	3
C Geology	24	15	10
D Biology	39	10	8
E Geography	15	4	3
F Economic Science and Statistics	21	15	1
G Mechanical Science	24	6	6
H Anthropology	11	8	10
	—	—	—
	207	65	43

The names of the Presidents of Sections will be found on page 110.

Thus it appears that 81 per cent. of all the papers read, in which total I include the addresses, were of local origin, a result which must be deemed satisfactory. There were 5 contributed by foreigners and 5 by gentlemen of whose nationality I am not certain. These are not counted. As might be expected, they predominated in the less abstruse or more practical subjects. It was remarked that although nearly one-third of the people of the Dominion are of French origin, there were very few papers which emanated from a French-Canadian source; this is probably to be attributed to the rural character of the bulk of the French population, but, in part, to the large share taken by ecclesiastics in the higher education of the Roman Catholic Church, and a certain misgiving, certainly not justified by facts, as to the relations of science to the truths of revelation.

A week of hard work was diversified by public and private hospitalities on a large scale, of which the conversazione at McGill College, and a reception given by the citizens at the Victoria Skating Rink, deserve especial mention for their brilliancy and success. Besides the excursion to Quebec, to which I have already alluded, and Lake Memphramagog, others were arranged to Ottawa, to the Eastern townships, and to points of interest nearer the capital.

The Astronomer Royal of Ireland, Dr. R. S. Ball, F.R.S., delivered a lecture, with his usual brilliancy and originality, to the towns-

people of Montreal, at the Queen's Hall, on "Comets;"* Professor Oliver J. Lodge addressed to the Members of the Association an able discourse on "Dust;" and the Rev. D. W. H. Dallinger, F.R.S., a lecture on "The Origin and Life History of the least and lowest Living Things."† If I may venture for once to obtrude a personal opinion, I would say that in the novelty of the subject to almost all present, in the beauty and clearness of the illustrations, which were thrown on a large screen by a magic-lantern, in the felicity and enthusiasm of the lecturer, this effort has never been surpassed at any meeting of the British Association. There was one other incident of the meeting too interesting to be passed over in silence. I mean the first public appearance of the Arctic hero, Lieut. Greely, U.S.A., whose sufferings and recent almost miraculous rescue were then the theme of every tongue. This gentleman, with Mrs. Greely, and his friend and comrade Lieut. Ray, who like himself had conducted one of the circumpolar observatories, was the guest of the Citizens' Committee. The warmest sympathy was felt for him, and the liveliest desire to see him, which caused the Geographical Section to be crowded to its utmost capacity. In introducing him to the meeting, the President of the section dwelt upon an incident to which notice has not been sufficiently called. To Lieut. Greely belongs the honour of having made observations with the pendulum, to determine the Polar compression and the figure of the earth, some $6\frac{1}{2}^{\circ}$ nearer the Pole than any previous Arctic traveller in America, and $1\frac{1}{2}^{\circ}$ nearer than Sabine approached it at Spitzbergen. It is of the utmost importance in this observation that the pendulum itself be transported back again unaltered to the station of origin, as the compression is inferred from the mean number of vibrations in one revolution of the earth on its axis, in two or more localities. Aware of this, Lieut. Greely, whatever he might lose, was determined to save his pendulum, and this heavy instrument, weighing more than 100lbs., was actually dragged by starving men from Baird Inlet to Cape Sabine, where he was found, and safely returned to Washington—an instance of devotion to science which may be termed sublime.

The papers of Lieut. Greely and Lieut. Ray read before the Geographical Section will be found in the proceedings of the Royal Geographical Society for November; they read papers also before the section of Anthropology, and I had the pleasure of filling the

* *Nature*, vol. xxx. p. 454.

† *Ibid.* pp. 619, 645.

chair at a complimentary entertainment, arranged under extraordinary difficulties for want of time and pre-occupation of place, by Captain Bedford Pim, R.N., which was given in their honour at the Windsor Hotel. An address of sympathy, bearing the signatures of Lord Rayleigh and Sir William Thomson, the present and the late President of the Association, and those of their hosts, was presented on this occasion to Lieut. Greely.

The meeting of the Association was brought to a close on Wednesday, September 8, by the usual formal proceedings, which included the announcement by the Treasurer, Admiral Sir Erasmus Ommaney, of the following abstract of the attendance :—

Old Life Members	235
New	20
Old Annual " Members	318
New	215
Associates	825
Ladies	74
Foreign Members	28
Honorary Members	60
Total	1,778

The appropriations of money in aid of scientific inquiries, several of which were committed to Canadian scientists, amounted to £1,515.

Among the recommendations of the Council were the following :—

(1) To call the attention of the Dominion Government to the absence of trustworthy information concerning the tides of the Gulf of St. Lawrence and the adjoining Atlantic coast, and to the dangers which thence arise to navigation.

(2) To urge upon the Dominion Government the importance of obtaining accurate and systematic tidal observations, and of tabulating and reducing the results by the scientific methods elaborated by Committees of the British Association ; and

(3) To suggest the immediate establishment of a sufficient series of observing stations on the coasts of the Dominion.

An excellent paper on the lighthouse system of Canada, read in the Mechanical Section by Mr. W. Smith, contributed not a little to the initiation of these recommendations. Coincident with the meeting of the Association, though not connected with it, was the despatch of the steamer *Neptune* to establish seven marine observing stations in Labrador, Hudson's Straits, and Hudson's Bay. These stations

are—Cape Chidleigh, Labrador; Resolution Island, North of Hudson's Strait; North Bluff, North of Hudson's Strait; Cape Hope, Labrador; Nottingham Island, Hudson's Strait; Mansfield Island, Hudson's Bay; Fort Churchill, Hudson's Bay. Among the grants was one of £50 for an investigation, physical and otherwise, of the north-western Indian tribes of Canada, which was subsidiary to strong recommendations from the President of the section of Anthropology and others, that the Dominion Government should take up the subject of British American Ethnology before it be too late, by founding a museum, and systematically preserving everything which will hereafter throw light upon the origin, customs, languages, and arts of the fast-disappearing red man.

The gratifying announcement was made on this occasion that a sum of £550 had been raised by the Association for the purpose of founding a gold medal to be given annually at McGill University, in the Faculty of applied science, under conditions which are left to the authorities of the University, in commemoration of the first visit of the British Association to the Dominion of Canada.

A subject of great local interest was brought forward by Sir R. Temple, seconded by Professor Boyd Dawkins and Sir W. Thomson, namely, the foundation of a Public Free Library in Montreal, towards which a munificent anonymous donation was announced. There are difficulties of a social nature growing out of the municipal constitution of the city not likely to be soon overcome, but the weighty advocacy of these distinguished persons cannot but have strengthened the movement.

It is needless to dwell on the interchange of grateful acknowledgment and cordial thanks for the unbounded hospitality extended to the Association, and of graceful compliment and satisfaction expressed by the representatives of the Dominion. Nothing was omitted which could confer *éclat* on the closing scene, and Principal Sir W. Dawson who appeared in his Academic robes, crowned the ceremony by conferring the Honorary Degree of LL.D. in the name of McGill University upon the following gentlemen:—

The Right Hon. Lord Rayleigh, F.R.S., President.

His Excellency the Right Hon. the Marquis of Lansdowne.

The Right Hon. Sir John A. Macdonald, Bart., G.C.B., V.P.

The Right Hon. Sir Lyon Playfair, F.R.S., K.C.B., V.P.

Professor Edward Frankland, F.R.S., V.P.

Captain Douglas Galton, F.R.S., General Secretary.

A. G. Vernon Harcourt, Esq., F.R.S., General Secretary.	
Professor T. G. Bonney, F.R.S., Secretary.	
Professor Sir W. Thomson, F.R.S., Pres. Section A.	
Professor Sir H. E. Roscoe, F.R.S.	B.
W. T. Blandford, Esq., F.R.S.	C.
Professor H. N. Moseley, F.R.S.	D.
General Sir H. Lefroy, F.R.S., K.C.M.G.	E.
Sir R. Temple, Bart., G.C.S.I.	F.
Sir J. F. Bramwell, F.R.S.	G.
Edward B. Tylor, Esq., F.R.S.	H.
Professor Asa Gray, F.R.S., Harvard University.	
Professor J. Hall, Albany.	
Professor Daniel Wilson, F.R.S.E., Toronto.	

The Association meeting broke up immediately. A large contingent of members (about 800) started the same evening for Philadelphia, where the American Association was arranged to meet on the Monday following. Not having been one of the number I have nothing to say about it, but the subjoined extract from *Science* of September 19, a publication which corresponds in the United States to *Nature* in England, is at once so gratifying to a British reader and so creditable to the writer's impartiality and breadth of view, that the Institute will pardon its length. The writer says:—

“ To us on this side of the Atlantic, the opportunity to profit by the contrast of the two Association meetings just closed ought not to be lost; and the desire to take advantage of it may justify a somewhat extended comparison of the two Associations.

“ Concerning what may be called the ‘physical features’ of the two meetings, their relation to each other may be readily seen by an inspection of the following statistics: At the Montreal meeting, the total registered attendance was 1,778, of which nearly half crossed the ocean, and about six hundred were classed as ‘old’ members. The total number registered was somewhat below the average of the past ten years, which was 1,889, not including last year’s meeting. The largest meeting ever held by the British Association was at Manchester, in 1861, when the registry was 8,944; the smallest, in recent years, at Swansea, in 1880, the number being 899. The number of registered members at Philadelphia was 1,261, the greatest number ever on the rolls of the American Associa-

tion at one meeting. It is not unlikely that the excess of more than five hundred in the membership of the British Association over that of the American is to be partially attributed to the rule of the British Association, which confines the privileges of attendance to members of one class or another; while the policy of the American Association has been to invite and to welcome all who are interested in the proceedings, regardless of membership.

"At the Montreal meeting, the total number of papers read was 827. At Philadelphia, 804 papers were read. The number of papers on mathematical and physical science was ten greater in the American than in the British Association. In the latter, however, the number of physical papers was greatly in excess, as those concerning pure mathematics were disposed of by a sub-section in a single day.

"In addition to the regular papers, there were, in the various sections of the British Association, more than fifty reports presented, coming from Committees appointed at previous meetings for the consideration of special subjects. Of similar reports in the American Association, it can hardly be said that there were any, such as were offered being mostly confined to a few words declaring 'progress,' asking for continuation, and promising something in the future; and even this much was only obtained after much labour on the part of the presiding officer.

"As to the general character of the meetings, it may be said that both were above the average. Sir William Thomson declared, at the closing session of the British Association, that it was one of the most satisfactory ever held; and both he and Lord Rayleigh declared that the meetings of Section A were far above the average.

"It can be affirmed without boasting, that Americans (citizens of the United States) contributed in no small degree to insure this success. At least forty, or about one-eighth, of the entire number of papers read, came from them. They joined in several of the important discussions, and generally with credit; and some of them—Newcomb, Rowland, and possibly others—presided over sections at various times. It is well worthy of note that, of the five papers recommended to be published *in extenso*, one was from Professor Gray and another from Professor Thurston.

"The Philadelphia meeting of the American Association was doubtless, all things considered, the most successful yet held. The work done in sections was, in general, of a higher order than usual; and we are, in turn, indebted to the visiting members of the British Association for valuable assistance in 'bringing up the average.' Many of them presented papers, and took part in the discussions which now and then arose in various sections.

"The greatly inferior quantity, if not quality, of the work done by our special committees, is unquestionably due, to a great extent, to a fact already referred to in these pages. The committees of the British Association are aided by grants of money, as much as \$7,500 being allowed at the Montreal meeting. Could the committees of our Association obtain such grants, their work would undoubtedly be vastly more satisfactory. Besides, being thus relieved from the purely mechanical drudgery of the work, the feeling of responsibility would be much greater, and each committee would recognise the necessity of justifying its existence, and of showing that the money given as aid had been well invested.

"On the whole, it will be admitted that the British Association does its work upon a higher plane than that occupied by the American. Its sectional work shows more that is really new and of lasting value, and less that is trifling; although there has been a steady and healthful improvement in the character of the American Association during several years past. It may be well to remark here, that there are at least a few of the ablest and best men in American science who have continued to exhibit no interest in the American Association; and that if the Association is not precisely what they believe it ought to be, the fault lies at their own doors. No others should or could be so influential in shaping its course and moulding its character.

"It may be well, however, to turn from the consideration of these graver differences between the two associations, and notice briefly some of those distinctions which are more personal in their nature, between the members themselves.

"Our English cousins certainly possess an enviable capacity for recognising the amusing side of affairs. At Montreal one came to expect pleasant little outputs of the mildest humour in the midst of the profoundest scientific dissertations. Your

formula might be torn to shreds by severe criticism, but your fun was welcomed without examination.

"In the matter of paying compliments, and moving thanks in easy and graceful manner, our English cousins have the advantage of us. It is the almost universal custom for the chairman of the section to thank the reader of a paper, and often in elaborate terms. This consumes a good deal of time, and it is a question whether such wholesale compliment is desirable. It was observed, however, that the distinguished and genial presiding officer of one of the sections made use of two quite different formulae for expressing his appreciation of the merits of the papers; in one case hoping 'that the section would join him in thanking Professor —— for his interesting and important communications upon this subject;' and in another, 'that the section would join him in thanking Professor —— for his communication upon this interesting and important subject.' The importance of the proper arrangement of words was never shown to better advantage.

"The undemonstrative character of the American as compared with the Englishman was exhibited in the public meetings of the two Associations. The American Association has seldom had so felicitous an address from a retiring president as that of Professor Young, and the probability that it was not generally heard throughout the vast Academy of Music was the only excuse for the fact that its many good points failed of that recognition which they so richly deserved. This failure was commented upon by an Englishman in a remark to the writer, that such an address would have been much more frequently applauded in England. 'We constantly interrupt a speaker to applaud him,' he said, 'if for no other reason than to afford him a breathing-spell.'

The great excursion promised to members of the Association, to the Rocky Mountains, started from Montreal on Thursday morning, September 4, one day being set aside for a public reception at Toronto. Although I followed the excursionists, after the interval of a day or two, as far as Winnipeg, I did not myself go further west than that place, and owe the information I possess to communications with which several of the party have favoured me, and to the excellent journal kept by Mr. Richardson, a reporter who accompanied them. It would be very ungrateful to pass over

in silence the preparations made by the municipality and citizens of Toronto to give a befitting welcome to the Association on the arrival of the excursion train on September 5. Those who were unable to get enrolled in the Rocky Mountains party, those (and they were many) who shrunk from a journey of some 5,720 miles, found arrangements made for smaller excursions—to the Experimental Farm and Agricultural College at Guelph, to Niagara Falls, and to Port Cockburn, at the northern end of Lake Joseph, Muskoka, all of which had numerous visitors. The excessive fatigue of the week in Montreal deprived the citizens of Toronto of the pleasure of welcoming Lord Rayleigh; he was represented by Sir Richard Temple, Sir H. Roscoe, and the writer. The honours of the city were, however, done to a very large number of members, and a reception was given by the Lieut.-Governor and Mrs. Beverley Robinson, which will not be soon forgotten by any who enjoyed their hospitality, or moved in the gay and festive throng, which, to the surprise of many, included uniforms of nearly every branch of the service, from the militia of Ontario.

It was much regretted that the attractions of Western Canada deprived the maritime provinces of a fair share of visitors, notwithstanding their proffered hospitality. Funds were raised, committees appointed, but very few of the expected guests appeared. A few geologists found in the wondrous carboniferous deposits of the South Joggins and the scenery in the vicinity an ample reward for leaving the throng. I have heard of only two adventurous members—one of whom was your secretary, Mr. O'Halloran—who reached Prince Edward Island.

This is the place, perhaps, to refer to one of the many collateral inquiries which engaged the attention of individual members. Mr. W. Lant Carpenter was entrusted with a commission from the New England Company of London, a corporation dating from the time of Charles II., to visit the Six Nation Indians at Brantford, Ontario, in whom that society has an hereditary interest. These Indians, about 8,200 in number, occupy a territory of about as many square miles in extent, on the Grand River, and are not diminishing. They preserve their several dialects, but are taught English at the schools, of which there are several. Mr. Carpenter was especially pleased with the Mohawk Institution, which is maintained by the Company, and gives superior education to forty-five Indian boys and as many girls from all parts of Canada, many of whom become teachers in Indian and even in white schools. To

this slender remnant is reduced the great confederacy which, even within the present century, could send its warriors into the field by thousands, and has filled so many pages of history with horror and romance.

That the Canadian Pacific Railway, structurally considered, attracted the keen and critical observation of many of its passengers is needless to state. An excellent paper upon it was read by Mr. Vernon Smith. I believe I am borne out in saying that the general feeling of professional men was one of satisfaction, save only that some of the trestle-bridges were thought too slight, and some of the present gradients west of the Rocky Mountains too steep. The miraculous escape of Dr. Selwyn and one of his assistants from being killed by a fall of rock from the west end of a tunnel in Kicking Horse Pass, was the most thrilling incident of their memorable excursion. I have not seen any further discussion of a discovery, announced by Dr. Macoun, of the Geological Survey,* which, if it could be confirmed, would be of extreme interest, namely, that in a cutting of the Canadian Pacific Railroad, at the Pic River, Lake Superior, a large copper chisel had been recently found under 25 ft. of alluvial clay and gravel, but 90 ft. above the present level of the lake. The natural inference is that the lake at the period of its loss stood 90 ft. at least higher than it does now, and there were signs that it must have reached a level 180 ft. higher still, indicating either immense geological changes within a few centuries, or much higher antiquity for the Indian race than has hitherto been attributed to it. One of the incidents of this excursion was the discovery of a stratum full of fossils, in the Kicking Horse Pass, by Prof. Boyd Dawkins and Rev. H. H. Winwood, in rocks previously considered unfossiliferous. They fix the age of the lower strata of the Rocky Mountains in that place as Cambrian.

I pass now to the subject which, beyond all others, whether social or scientific, had attractions for the greater number of travellers. I mean, of course, emigration. Many members of the Association were personally concerned in some one or more of the plans for its promotion. Minds not easily deceived by appearances, or led astray by sensational reports, were turned in a spirit of anxious inquiry to this investigation, not a few, probably, with views of their own as to the application of the

* *Montreal Gazette*, September 1, 1884.

knowledge they hoped to acquire. Personally, I took every opportunity of informing myself of the working of the official agencies for conducting it, and of the very numerous private schemes of benevolent origin for bettering the condition of the working classes. I have been favoured by several gentlemen with the results of their own independent inquiries. In fact, the material available in forming a judgment is so abundant, that my difficulty has been to make a selection concise enough for the limits of this paper; but it seems so important to establish the truth at the mouth of many witnesses that I may be pardoned for devoting the remainder of it principally to this topic. I include, however, the opinions expressed by numerous high agricultural authorities who visited the North-West, on its capabilities. Not as if evidence on that subject were wanting, but because the question here is the impression it produced upon the guests of the Canadian Pacific Railway Company, who were so royally franked through its wide extent. I was not aware when I drew up this paper, that Professor Tanner, Director of Education under the Institute of Agriculture, had visited the North-West with an object identical to what I had proposed to myself, viz., to collect evidence from sources above suspicion, and was about to publish it in the two excellent Reports he has just issued (Macmillan & Co.).

Let me observe that immigration is, of course, of vital importance to the Dominion of Canada; it was freely admitted by the Government of Sir John A. Macdonald in the debates which preceded a final decision as to the Canadian Pacific Railway (1881) that its success would require about a million of souls to be introduced into the North-West in the course of the succeeding ten years; and gigantic efforts have been made to bring this result to pass. The actual population of Manitoba and the North-West, by the census of 1881, was but 113,984, and the returns of immigration for 1882-3 do not warrant the supposition that it is much beyond the quarter of a million yet. We, however, are more concerned with our own population. Every statesman, every philanthropist has nearer at heart, even than the aggrandisement of the Empire, the relief of that chronic destitution and misery, with its accompaniment of ignorance, drunkenness, and vice, which seems the lot of many millions of our own countrymen and country-women. Almost all thoughtful persons admit emigration to be the most promising remedy. A certain reluctance on the part of employers of labour, an uneasy jealousy on the part of certain political leaders, weigh but little against the strong current of

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opinion in that direction, which is characteristic of the times we live in. If I make no allusion here to other fields than those the Dominion of Canada presents, it is from no want of appreciation of their attractions, but simply because Canada only is the subject before us.

I need not occupy the time of the meeting with very full statistics of emigration, which will be found in the annual reports of the Minister of Agriculture for the Dominion of Canada, but the following figures from the last report (1888) will furnish a basis of fact:—

TABLE III.

There landed at	1882.	1883.	1882.	1883.
	QUEBEC.	HALIFAX.		
English	20,881	21,897	..	5,597 5,435
Irish	8,195	12,085	..	999 1,178
Scotch	4,617	3,980	..	514 237
Germans	1,024	1,434	..	39 54
Scandinavians	8,279	4,763	..	1,665 243
French and Belgians..	50	306	..	6 4
Icelanders	129	1,413		
Russians	270	56		
Russian Jews	1,375	—		3 1,324
Austrians	30	—		
Swiss	—	22		
Totals	44,850	45,966	8,723	8,475

Of these numbers only 18,085 passed through the emigration agency at Toronto in 1888, including those who came from the United States, and only 8,853 reported themselves as on their way to Manitoba; 14,233 remained in the Province of Ontario; 2,970, chiefly Germans and Scandinavians, passed through on their way to the Western States. Many of these are eventually attracted to the Canadian North-West by the facilities of obtaining land.

But the great movement of population into that region in 1888 was from the Eastern Provinces of the Dominion and the United States, by way of the frontier town of Emerson, on the borders of Dakota, and it is necessary to discriminate between those who directly swell the ranks of labour, and are indeed what is commonly understood as the emigrant, and settlers of various ranks and callings; the former alone pass through the emigrant offices.

The Government immigration sheds at Winnipeg accommodated in 1888 the following numbers:—

The British Association in Canada.

TABLE IV.

	Men.	Women.	Children.	Total.
English	1,235	329	593	2,159
Irish	209	134	224	567
Scotch	330	134	252	716
Canadians	597	290	413	1,300
United States	90	45	98	233
German and Dutch ..	58	33	47	138
Scandinavians	118	44	83	245
Icelandic	276	297	338	911
French and Italian ..	66	14	36	11
	2,979	1,320	2,084	6,385

But there entered the Province of Manitoba, at Emerson, a vastly larger number of persons, who were not emigrants in the usual sense, namely—

TABLE V.

	1882.	1883.
From Ontario	38,327	17,351
Quebec	2,196	2,024
Nova Scotia	1,997	1,297
New Brunswick	1,486	844
Prince Edward Island	376	370
United States	13,325	13,998
English	6,962	6,160
Irish	1,043	1,339
Scotch	2,359	532
Germans	319	247
Swedes	107	20
Norwegians	—	30
Icelanders	60	11
	68,556	44,223

Many of these, of course, made no permanent stay, and there is no possibility of keeping any exact debtor and creditor account. We have enough to show that although the arrivals are, as yet, very far short of 100,000 a year, the number of immigrants is rapidly and steadily populating the country.

Let us now turn to the agencies of public and private benevolence which are contributing to this result.

TABLE VI.

	1883.
The Fund administered by Mr. Tuke ..	1,323
The Irish Unions ..	2,460
Cardinal Manning ..	62
Miss Rye (female children) ..	159
Miss Macpherson ,,	197
Miss Bilborough ,,	189
Mrs. Birt ..	108
Mr. Middlemore ..	125
Rev. Dr. Stevenson ..	42
Dr. Barnardo (boys) ..	173
The Shaftesbury Boys' Home ..	35
	4,873

A paper on Irish Emigration, by Mr. Tuke, was read in Section F, in which the total number of persons already assisted to emigrate by that gentleman was given as 9,482.

But there are various other benevolent agencies which, if suspended in 1888, were active in previous years. I subjoin, therefore a more complete list, showing the total results for five years, 1879-1888.

TABLE VII.

Number of immigrants, chiefly children, brought to Canada under the auspices of various charitable societies and individuals during the past five years (Rep. of Min. Agric., 1883, p. 24):—

	1879-83.
Ballyshannon Union	14
Dr. Barnardo	229
Miss Bilborough	488
Mrs. Birt	503
Mrs. Cadle, Kent	18
Cardinal Manning	273
Carriekshannon Union	8
Catholic Protection Society, Liverpool	130
Children's Home, London	39
Boys' Farm School, Birmingham	2
Lord A. Douglas	40
Dublin Union, South	147
Friends' Mission, Dublin	6
Lady Hobart (East London Family Emigration Fund)	39
Miss Kennedy, Dublin	9
Kingswood Reformatory	11
Miss Macpherson	728
Mr. Meredith, London	12
Mr. Middlemore	346
Mohill Union, Leitrim	10
Mulligan Union	39
Rev. Mr. Nugent, Liverpool	79
Old Castle Union	16
Preston Board of Guardians	28
Mr. Quarrier, Glasgow	134
Miss Rye (girls)	524
Earl of Shaftesbury	35
Sisters of Mercy, Loughrea	10
Rev. Mr. Stevenson	136
Children's Home, Hamilton	
Tralee Convent	41
Mrs. Vatcher, St. Phillips', Stepney (girls), number unknown	13
Rev. Mr. Wood, London	11

This list is probably pretty complete as regards child-rescue, although I do not identify 800 sent out by London Boards in 1883; but it gives no adequate idea of the scale upon which private benevolence has been instrumental in the removal of individuals and families, with or without State aid, to new homes and new fortunes.

I had the pleasure of visiting Miss Rye's headquarters near

Niagara, of freely examining her books, and of seeing the happy faces of the girls then in the house. To say that no disappointments occur would be to attribute to her little waifs of humanity a uniform goodness found in no other class, and to their mistresses a perfection of temper and judgment which is, to say the least, rare in higher ranks. They form, however, a very small proportion of the cases. There is the material of many a romance in the fortunes of these children, who are often adopted by childless couples, who take them off her hands, and, in not a few cases, they have succeeded to modest fortunes. A letter with which I have been favoured by Dr. Barnardo is so interesting that I must quote it nearly in full :—

“ I have established at Peterboro', Ont., a Home capable of sheltering 150 children of either sex, and to that place we send out each year three, four, or five parties, as the case may be. These are in number from 80 to 121, which was the largest number we have ever sent out at one time.

“ I have been doing emigration work in a kind of way for fourteen years, that is to say, for the first eleven years I have used the instrumentality of others to place children out, and have not sent out very large parties during that time. But during the last three years I have actively begun to work on our own behalf, organised our own parties and sent them out under the care of our own staff. Altogether I have emigrated a little over 600 boys.

“ During my recent visit to Canada I saw, roughly speaking, 250 of these. I cannot give you the exact numbers, for it would take too long now to refer to my note-books, all of which are not here.

“ The boys were, on the whole, well placed ; in a few instances they had to be changed and put in other situations, but such instances were, as I say, the exception rather than the rule. The great majority were admirably circumstanced in good, healthy surroundings, had been kindly treated, well fed, were well lodged and clothed ; where young enough were under instruction still, going to school in the winter, and all of them, with one or two exceptions, attended Sunday-school and church, and were known to the clergy or ministers of the neighbourhood.

“ I never was more pleased with the moral influences exercised over boys I have sent out into life than with the whole atmosphere, social and general, investing these boys and girls in Canada.

" So far as we have had to do with it, the Government Agency has been good, and for the most part successful. The worst difficulty lies, however, in the clashing between the Dominion agents and the Provincial agents. You understand the Dominion Government have their own agents at Quebec, so also has the Provincial Government of Ontario, and unless one uses great skill and prudence, difficulties are thrown in the way of transit which, theoretically, are supposed not to exist. At the same time, I have generally managed to surmount all these, and if there be prudent and experienced people at the head of the parties sent out, no very serious delay can occur from the cause I have mentioned.

" All the foregoing refers only to boys and girls placed out in the Province of Ontario. But during my recent visit I went as far as the Rocky Mountains, carefully inspecting the whole line from Winnipeg to British Columbia, with the view of discovering a suitable location, and have succeeded in finding a place where I hope to establish an industrial farm. I am now in communication with the Dominion Government on this subject, and expect that success will after a while crown the effort. I have not therefore had any experience as yet of placing boys out further west than Winnipeg, but I made careful inquiries of young lads and young men who had gone out there by themselves, or were placed out by other agents, and the impression conveyed to my mind all along the line was, that there is an immense opening for boy-labour of the right sort, and that the results will repay any properly organised scheme."

As to adults, the Woman's Emigration Society, of which H.R.H. the Princess Louise, Marchioness of Lorne, is president, has sent out 122 persons to Canada since 1881. It had advanced to its emigrants by way of loan altogether £851, of which £786 has been already repaid. This includes sums advanced to other than the 122 persons here mentioned. This society is strict in requiring an unblemished character as a condition of assistance, and rigorous in its investigation.

The United Englishwoman's Emigration Society, with which I may particularly connect the name of the Hon. Mrs. Joyce, has sent out many, but I have not the figures before me.

The Girls' Friendly Society has promoted the emigration of many young women of the class of domestic servants, for whom there is almost an unlimited demand.

The Female Middle-Class Emigration Society * is chiefly concerned with Australasia, but has aided the emigration of 18 ladies to Canada since 1882. This Society takes security for the repayment of its advances within two years and four months. Its honorary secretary remarks: "From all our emigrants we get good reports. They are happy and contented, and not one remains without a situation longer than a fortnight after landing. Many go to relatives, and those who leave relatives behind them here frequently induce them to follow them, by the cheering accounts they send home."

The Colonial Emigration Society,† under Viscountess Strangford, is also chiefly concerned with Australasia.

The British Ladies' Female Emigration Society‡ has been long established, and devotes itself much to the due protection of female emigrants. No less than 92,950 single women have gone out since the formation of this society in 1848, under the charge of permanent matrons selected by the Committee. I do not doubt that there are other benevolent agencies at work of which I am ignorant.

To all who are engaged in this wide field I would commend the following judicious remarks of Captain W. C. B. Grahame, the Government Immigration Agent at Winnipeg:—

"Of the female help that arrived in this country during the past season (1888) I would say that I had little or no difficulty in finding good places for all worthy applicants; I would, however, remind the good people who are interested in female emigration societies in the Mother Country, that they cannot exercise too much care in the selection of young women for servants for the Colonies.

"The idea has unfortunately gained ground that young girls can find ready employment, at high wages, in this country, no matter what their qualifications may be. The day for employing untrained domestics is passed. It is true that a clever, good girl who is willing to be taught, will find plenty of mistresses who will teach her and pay her accordingly. This, however, is not always satisfactory. The difficulty heretofore has been that all new-comers place too high a value upon their services, refusing to take situations at less than \$15 to \$20 a month, and many of these, I am sorry to say, know very little if anything of the duties of a domestic servant.

* 19, Sutherland-gardens, Harrow-road.

† 13, Dorset-street. ‡ 43, Fitzroy-square.

"I would also respectfully urge that the morals of the young women sent out to this country should be of such a nature that the agent would have no hesitation in recommending them to respectable families. There has, unfortunately, been some exception to this rule during the past season."

A single parish clergyman from the South of Ireland, the Rev. G. R. Wynne, of Killarney, has sent out three or four hundred labourers and their families, and made a journey to the North-West to inquire after their welfare, in September, 1883.

Through the active agency of the Rev. A. Styleman Herring, Vicar of St. Paul's, Clerkenwell, more than four thousand persons have been assisted to emigrate.

I have shown 1,372 Russian Jews as landing at Quebec in 1882. They are only a detachment of about 20,000 Russian Jews sent to America at the expense of the Mansion House Fund for the relief of that persecuted race, and who were visited last year (1884) by one of the benevolent founders of the fund, Mr. Samuel Montagu. They are chiefly at Painted Woods, in Dakota, some at Vineland, New Jersey, but many are settled on land at Moosomin, and promise to make excellent agricultural settlers; many are in Winnipeg.

There is the East London Colonisation Society, under the patronage of Lady Burdett-Coutts, an experiment so remarkable, that I must dwell upon it.

This movement originated with the Rev. Hugh Huleatt, formerly an army chaplain, now Vicar of St. John's, Bethnal-green. The families were carefully selected, and sent out in charge of a Scripture-reader, Mr. Young, who had been accustomed to farm life in his early days, and thus not only exercised a strong moral influence for their good, but also aided their inexperience. He has since been duly licensed as a lay-reader by Bishop Anson. A free grant of 160 acres of land was procured for each family, and a sum of £100 was advanced on account of each, on the security of their separate homesteads, to be repaid by them, with interest, within ten years. Of this sum, £80 per family was appropriated to their transplantation, and £70 placed in the hands of an agent, to be laid out in establishing them. It is said that £100 has hardly proved sufficient; £125, at least, is required, prices having risen above the first schedule, but it is all that can be legally secured on the land. There has not yet been time to test their ability and readiness to repay the advance.

The colony consists at present of nineteen families, chiefly from

Bethnal-green. Many of them had never been out of London in their lives ; few or none had the least acquaintance of rural labour or experience with husbandry. Yet it makes the heart glad to read the reports of those who visited them in their homes and beheld their well-being. To what are we to attribute this result ? It is, first, to the dormant energies called into activity by contentment and hope ; the broken chain of pauperism leaves a freeman, and it is—

“Freedom makes man to have liking ;”

“He lives at ease who freely lives ;”

next, to the liberality and the wise philanthropy that guided the first steps, and determined on colonisation rather than mere emigration. These people were visited by the Rev. H. Huleatt himself, by the Rev. Canon Harry Jones, by Professor Tanner, by Mrs. Joyce, and others, with one favourable opinion, scarcely qualified by any misgivings. Bishop Anson, on October 5 last, remarks : “Two or three have, as might have been expected, turned out badly, and returned.” Canon Harry Jones, noticing some of their complaints and disappointments, which are quite inevitable, expresses the opinion that some few possibly may fail altogether, and return speaking evil of the land. Some may have a very hard pinch in the coming winter, but he believes that they will eventually win, and that if their condition now should be compared with what it was in London, it must be regarded as much improved.

I may here observe that their munificent patroness, Baroness Burdett-Coutts, sent out a supply of warm clothing for the winter, in September, and that Messrs. Shoolbred presented each family with a pair of warm blankets.

And now, who were these people ?

1. A plasterer and small builder, wife, and four children.
2. A cab-driver, wife, and daughter.
3. A wine cooper, large family.
4. A carpenter, wife, no family with him.
5. A retired polleeman, mother, brother, and large family.
6. A milkman, wife, and one child.
7. A working engineer, wife, and four children.
8. A cabinet-maker and cats'-meat man, wife, and four children.
9. An ex-private of Marines, wife, and five children.
10. A shoemaker, wife, and seven or eight children.
11. A blacksmith, with sick wife and weakly family.
12. A carman, wife, and family.
13. A Westminster man, trade unknown, wife, and large family.
14. Also a Westminster man, wife, and three children. These two men, previous entire strangers, have contracted a touching degree of mutual friendship, and work in partnership.

15. A painter, finds he can do better at his trade than on his land.
16. A milkman, with a stirring notable wife, who has already a large stock of poultry.

Of the other three families, I have not the same particulars; one of them is that of Mr. Young, the lay-reader, and scarcely in point. The foregoing embarked from London on April 27, 1884. They reached their locations on May 14, and potatoes of their raising were selling at Moosomin on September 10. Evidently "the business end of a wheelbarrow," as it has been quaintly called, unfamiliar as it may have been to them, was not beyond their capacity of learning. They are bound to break up fifteen acres within three years, and had actually broken up, on the average, over eight acres the first summer.

Now, I did not myself get further west than Winnipeg. Having visited that settlement when it was known as the Red River, in 1848, I had a strong desire to see it again, and had it not been very well described by Mr. Alexander Begg to this Institute last April, I should be tempted to say something on the marvels to me of its present aspect, and how I identified without much difficulty one of my stations of magnetic observation, then the centre of Fort Garry, at a point in the centre of the main street of Winnipeg. Mr. Begg was there many years later (1867), but it had undergone little change. I should say that Winnipeg in 1848 was much what it was in 1867, "only more so." It had, I think, no Directory, and the startling announcement I observed in the Directory of to-day was not required: "There being no regular method of spelling names, if the name wanted is not found under your way of spelling it, try some other way, and you will find it." It has reference, probably, to the numerous foreign names. But if mine did not, many scientific eyes beheld the vast plains which lie between Winnipeg and the Foot Hills, and their reports convey that independent testimony to which I alluded at the beginning of this paper.

Dr. Gilbert, F.R.S., of the Experimental Farm, Rothampstead, who visited Manitoba in 1881, and also joined the excursion of 1884, wrote after the former visit:—

" My personal inspection assured me that undoubtedly there is a most extraordinary promise of success for agriculturists in Manitoba. The soil is exceedingly fertile throughout wide stretches of the country, where for ages the natural vegetation has continued in its present unbroken condition. If a man has capital and education, he may realise a fortune in a few

years. If he has neither one nor the other, he can make a far better living than he could ever hope to do in England, and obtain a competency for his old age; whilst his children will receive a sound education, almost, if not entirely, at the cost of the Government. But there is one necessary reservation to this statement. It is perfectly useless for any person to emigrate unless he is prepared for hard work. Without industry there is no prospect. The idle and shiftless will find no fortune ready made to their hands; whilst, if disposed to be unsteady and intemperate at home, the probability is, the mere change of scene and surroundings will not make them any better." *

I have here—it is, unfortunately, too long to read—the joint report of Sir J. B. Lawes and Dr. Gilbert, "On some points in the composition of soils, with results illustrating the sources of the fertility of Manitoba prairie soils," a paper read before the British Association, of which an abstract appeared in the *Montreal Gazette* of September 8, and the latter has favoured me with a communication on the results of his second visit, of which I will read some portions:—

"There can be no question that there are very great stores of accumulated fertility from past vegetation in the vast areas of prairie land of the North-West. This fact is satisfactorily established, not only by the experience of settlers, and by the appearance of the crops, but chemical investigation of the soils leaves no doubt on the point.

"In the joint paper by Sir J. B. Lawes and myself, which I gave at the Montreal meeting, the results of a laborious experimental inquiry on the subject were given.

"To conclude on this point, no difficulty or question can arise as to the vast extent of very fertile prairie lands, and of their suitability for immigration, so far as fertility is concerned.

"The difficulties, such as they are, are connected, not with the soil, but with the climate, the scarcity of wood in many districts, and also, more or less, with the water supply. Meteorological statistics are very meagre, but certainly the winters are long and severe, though, as a rule, not unhealthy, and the summers short. Still, wheat, and, to a less extent,

* Report Min. of Agriculture, 1883, p. 192.

other products have been grown with success at various points over a large area of prairie region ; and that mixed agriculture, with the growth of various crops and stock-feeding, has not hitherto been more general is due to the scarcity of population and of labour, and to the fact that under such circumstances wheat is the most immediately marketable produce for the new settler rather than to difficulties in connection with the climate.

" As illustrations of settlement, it may be stated that in 1883 Lady Cathcart sent out 10 families of crofters from Scotland, in all 49 souls, who were mostly settled by the aid of Mr. Bennett, the Government immigration agent at Brandon. They were settled on Pipestone Creek, south of Wapella Station, 285 miles west of Winnipeg. They chiefly took quarter sections (160 acres) ; they had plenty of wood and water on their homesteads, cut their own wood, built their own houses, and commenced with, say, a pair of oxen, a farm waggon, a plough, a harrow, and one or more cows, involving a capital of about £100, some of which was lent by Lady Cathcart on the security of the homesteads, at a moderate rate of interest. In 1884, 45 more families, comprising 289 souls, came out. In 1884 the first 10 families raised about 2,000 bushels of wheat, besides barley, oats, and potatoes ; they will have a considerable surplus produce for sale, and are said to be very content. For the 160 acres, \$10 are paid to the Government, the conditions being that the settler shall reside on the property six months a year for three years, and bring at least 80 acres under cultivation in the three years.

" As to the feeding character of the prairie grasses to which you refer, they grow on very rich soil, but owing to the meteorological conditions the growth is restricted, the result being a sparse but well-matured herbage, upon which cattle thrive well. It is true that in the cattle ranches the area per head is enormous ; but so large is the area suitable for cattle ranching that the gross yield of meat must, I imagine, in time be very great."

Professor Sheldon, of the College of Agriculture, Downton, writes :—

" Colonists as a rule are contented, because they have hope of improving their condition. Yet there are some who having gone out ill-fortified in mind to meet the toil and isolation

which fall to the lot of most colonists, find fault with everything. Colonists must be prepared to toil long and steadfastly, to be steady and frugal, and to deny themselves many of the little embellishments of life which are within the reach of almost everybody in England. Given these things, the colonists in Canada can hardly fail to get on. In view of the present conditions of wheat growing, I hardly think the North-West will require very large numbers of purely working farm hands for some little time, and it seems to me that such men would be better located in New Brunswick or Nova Scotia, where the employment is more evenly distributed over the whole year. At present the surplus farm hands of the North-West have to find work in the United States in winter in the lumbering line, and such migrations of labour are accompanied by a wage rate which is too high for wheat-growing farmers to pay. The Bell Farm (Indian Head) is a striking instance of the capacity of the North-West for wheat growing on a large scale and on commercial principles. We shall see, however, how the present and prospective low price of wheat will affect farming on so large a scale.* Major Bell informed me that at present rates of freight he could place wheat in Liverpool at £1 per quarter; after paying 8 per cent on his capital. I express no opinion on this point with regard to the Bell Farm, but I believe ordinary farmers in the North-West cannot afford to do any such thing.

" Some portions of the North-West territory are tolerably well adapted for dairy farming and stock raising, even in the prairie country. Shelter, however, is scarce, and the country needs to have belts of trees planted for this purpose. In the Foot Hills of the Rocky Mountains and in the prairies adjacent thereto, the land is well adapted to the pursuits I have named, for shelter and water are tolerably plentiful, and the herbage is of superior quality.

" The difficulty in respect to winter employment of farm hands presents a problem whose gravity is increasing and must increase, and which can hardly be solved until the farming of the country is of a mixed character, which admits of stock raising, and its attendant duties in winter. So long as wheat growing is by far the most important feature in the North-

* The estate contains 10 square miles, or some 64,000 acres, *ex* roads; 5,000 acres were under wheat in 1884, 2,000 under oats.

West, the problem of winter employment for men will remain as it is."

Professor Fream, of the same College, writes :—

" Settlers with whom I conversed expressed themselves as satisfied with their prospects, and I believe that in the great majority of cases, the outlook—provided the settler is prepared to 'rough it' at first, will work hard, and does not undertake the cultivation of more land than he can reasonably expect to manage—is encouraging.

" 2. I think the better and more intelligent class of agricultural labourer is likely to do well 'out West,' especially if he is thrifty, and far-sighted enough to save money in summer to help carry him through winter. Men of this type ought in a few years to be taking up quarter sections (160 acres) for themselves.

" 3. Agricultural and dairy value of the country west of Winnipeg. I saw much land which I should regard as excellently adapted for agricultural purposes, and I consider the results obtained this year at the ten experimental farms of the Canadian Pacific Railway are both encouraging and reassuring. But I fear that there is too great a tendency among settlers to deteriorate the soil, both by exhaustive cropping and by slovenly tillage, and that this fair heritage is in danger of being spoiled unless more regard is had to the necessities of the future. A settler is ill-advised who attempts to farm more land than he has capital and labour requisite for, and he would obtain results more satisfactory to himself and better for the new country were he to content himself with farming a small holding well rather than attempt to work a larger area than he can efficiently control.

" No prairie farmer should, in my opinion, confine his operations exclusively to wheat-growing; he should, on the other hand, endeavour to make himself as independent as possible of fluctuations in the price of corn, which in some years might militate very seriously against him. I would, therefore, advocate mixed farming, and the cultivation of at least enough potatoes to supply the farmer's own house. Potatoes, I believe, will grow excellent crops. A few cows for milk and butter (and possibly cheese) should be maintained on every farm, and on such soils and in such localities as cattle are found in this way to thrive, their numbers should be increased, and the style of farming modified in the direction of that distin-

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guished as 'dairy farming.' The cultivation of 'roots' should receive a fair trial on every farm, as, if stored for winter use, they would form a valuable adjunct to prairie-hay for cattle feeding. Each farm, again, should maintain a greater or less number of pigs, and these would be largely fed on materials which might otherwise be lost. The exigencies of prairie life are, and must long continue to be, such that those farmers will probably succeed best who can supply their tables almost entirely from their own farms, with potatoes and vegetables, milk, butter, and bacon, for example; and who will thus find themselves less dependent on the actual money value of their cereal produce. As to sheep-farming, I am at present doubtful whether this would be found *generally* practicable, the necessity for winter shelter placing difficulties in the way of the maintenance of flocks on mixed or arable farms.

"5. Probable north limit of ranching: somewhere about the latitude of Calgary. Ranches north of Calgary have been transferred south."

Major P. G. Craigie, of the Central Chamber of Agriculture, has published his impressions in the "Farmer's and Country Gentleman's Almanack" for this year. He writes:—

"My inquiries were more directed to the general agricultural position and the prospects of a competition in wheat or meat from Canada, which our farmers here might have to dread, than to the success of different classes of emigrants, although I had occasionally opportunities of interviewing some recent settlers. The two chief complaints I met with were the unremunerative price at which the good wheat crop of this season was likely to sell, and the impolicy of the Canadian protective duty upon agricultural implements, which limited the choice of the settlers. The necessity of the smaller men buying their implements on credit also greatly raised the price. The great want of a large class of settlers was the very old one, lack of capital; and in some, perhaps a good many cases, where failure had resulted, the men were probably little accustomed to rough agricultural life, or of a restless, impatient, non-persevering disposition."

Upon the question of capital I would refer to the evidence of seventeen *bonâ fide* settlers, given by the Welsh delegates last year in their report to the Minister of Agriculture (No. 46, 1888). They almost all consider that a working-man should have £200 to start with.

I have cited the foregoing opinions at length as of independent and highly competent observers, who took time for their inquiries. The impressions of gentlemen hurried through the country by special train, in the finest weather, receiving addresses of welcome at eve, halt, and replying in the terms of enthusiasm which such holiday conditions naturally inspire, may be equally flattering and equally sincere, but do not rest on so solid a foundation. What, however, their eyes could not be deceived about was the tacit testimony of steam ploughs, of Deering's self-binding reapers, of mowing machines, horse-rakes, and labour-saving machinery of the most advanced description, which met them at every considerable station; or in the quality, far in advance of the ordinary prize standard at home, of the agricultural products brought together for a provincial show at Winnipeg.

They learned from a paper on the Geology of the Line of the Canadian Pacific Railroad, especially circulated for their information by Principal Sir W. Dawson, that Nature has stored an abundance of coal in Assiniboina, if not in Manitoba, and they probably learned, for it is the fact, that a corresponding abundance of iron ore has been recently discovered on Big Island, Lake Winnipeg. Above all, the vastness of the territory was brought home to their consciousness by eight days of rapid travel, not through illimitable forests, repelling and almost defying the husbandman, but through boundless meadows that seem to woo the plough. The eloquent spokesman of the party, Sir Richard Temple, wound up their experiences by saying to the people of Winnipeg:—

"We came here with high anticipations, and those anticipations have been more than fulfilled; we were struck with admiration of all we saw and heard, and I am quite sure our evidence will be satisfactory to the well-wishers of the North-West in the highest degree."

I could quote to the same effect Professor Boyd Dawkins, Dr. Cheadle, and other scientific authorities, but time does not permit me; neither is it possible to relieve this paper by verbal pictures of the magnificent mountain scenery that rewarded their fatigues when the Kicking Horse Pass (5,300 feet) was actually reached on September 12, and when the excursion crossed the boundary into British Columbia. But this scenery will be no slight factor in the future popularity of the Canadian Pacific Railway, being, on the testimony of one who has seen them all, far more beautiful than that on any other trans-continental line.

But the subject expands far beyond the limits of a single address.

I will close this paper with one observation: that if from excess of party spirit, from want of wisdom in statesmen, or of patriotism in people, from ignorance of our Imperial resources, or want of courage to use them, we allow our present opportunities of colonisation to slip, the future historian of the decline and fall of Britain, whatever he may omit, will not fail to record, to our shame, that she had in her hands the endowment of half a continent, but lacked the vigour to go up and possess the land.

DISCUSSION.

The Right Hon. Sir LYON PLAYFAIR, K.C.B., M.P.: You must have all been pleased with the exhaustive manner in which Sir Henry Lefroy has treated this subject in describing to you the actual success of the British Association and its sectional work, which was much above the average. He also has drawn your attention to consequences, and to the opinions which such a well-qualified man as himself was able to draw from what he actually saw. For myself, I thought always that this meeting was one of great importance, not only to the British Association, but also as a real marking-point in the advance of civilisation. Only think what it was. The science of England, the science of the United Kingdom, does not belong to Great Britain. It belongs to the whole Empire. Our great men are the great men of every part of the Empire, distributed all over the world. They claim our great men as being their great men. Our Shakespeares, Walter Scotts, our Burns, belong to them as well as to ourselves. Our Newtons, our Faradays, our Daltons, are their philosophers as much as they are our philosophers. And, therefore, whilst all of us, I am sure, here, and whilst the public generally are taking so much interest in the Federation of our Colonies, there was one step which could be at once taken, before politicians had time to remove the difficulties with regard to the greater scheme, and that was that the science of the Empire should be federated. The rules of the Association luckily have been drawn so broadly that the British Association was founded for the advance of science in the Empire of Her Majesty, and it was quite right that Canada should be the first to try the experiment and bring her men in contact with our scientific men. Canada had done a very great work. There are many instances of Federation, but in almost all the instances of the Federation of different States that Federation has been brought about by pressure of war. I might mention the Netherlands, the United States, Austria, and Germany—all States which have

federated themselves in time of war, but Canada federated itself in a time of profound peace, and has shown a power—a political power—of bringing together races of different kinds, with sharp differences of religion, and federating them into one common State, which is of great extent and of great strength now, and of enormous promise for the future. It was just that a country which had done so much for Federation in that direction should be the first to try the federation of science. It may be said, of course, that what Canada wants above all things is not pure science but applied science; that she wants to bind a vast continent by railroads—territories as large almost, if you take one State out, as the United States. But she knows that applied science does not come unless pure science precedes it—that the applications of science only come from the overflowing of the fulness of science itself; and Canadians asked the promoters of science for its own sake to go amongst them and tell them how they must advance that science which had led to so many applications, and in that Canada showed great wisdom. I did not know I had to speak at all, and I am afraid I have spoken too long. ("No.") I was much struck, in travelling in different parts of Canada, with the quality of a good many Colonists I met. In speaking of that to my noble friend (the Marquis of Lorne) at dinner to-night, I told him an anecdote of a Colonist whom I met, and who had the real sterling stuff that a Colonist ought to possess, and he made me promise to tell you the story. I was travelling in rather a wild part of Ottawa, where there are some mines, and, going along one bank of the river, I saw a mine on the other side. I got a boat and went across to it. I found nobody on the ground; it was dinner time, and the workers, in their primitive way, had gone away altogether, so there was no one left. With my geological hammer I began to appropriate some of the best specimens. Presently a very tall man, with large leather gaiters, and walking as if he had on seven-league boots, came down the hill and warned me off from the mine. He said, in broad Scotch, "Have you got a 'permit' from the directors?" I said, "I am only interested in the geology round here, and I have not got a 'permit' from the directors." "Then you must gang off the ground," he said. I said, "Man, ye come from Glasgow." He said, "Ay, I come from Glasgow; but if ye have no get a 'permit' from the directors ye must go." "Don't you think you are talking to a mining adventurer?" I said. "Ay, that is just what ye are." I said, "No, I am a Scotch professor." "Well," he said, "what name?" "Playfair." "Do ye mean Lyon Play-

fair?" "Yes, I am Lyon Playfair," I said, looking very much astonished; "but how do you happen to know my name?" He said, "Your name has travelled further than your wee legs will ever carry you." I, of course, got interested in the man; and, after he found I was not a mining adventurer, nothing was too good for me. He took me down the mine, and sent his little daughter to get dinner for me, telling me he had some good mutton and a drop of real good Scotch whisky. We became great friends. He told me he was educated at the Mechanics' Institute, Glasgow, and afterwards attended the evening classes at the Andersonian University. I found my friend a good mineralogist and a fair chemist. He had a few bottles with which he tested the minerals. I asked him if there were many of his compatriots in Canada with an education like his own, and he said he knew many, and they always got on. That class of men, men of practical education, if they do not get on in their own country, could not do better than try Canada, where, I believe, they would soon rise above the position of labourers, and are certain to succeed.

Sir CHARLES TUPPER, K.C.M.G., C.B. (High Commissioner for Canada): I regret very much that I was unable to attend, as I should very much like to have done, the interesting meeting of the British Association recently held at Montreal, but I am glad to have had the opportunity of listening to so interesting an account of the meeting, and to learn as we have done, both from the gallant General who has read the paper and the right hon. gentleman who followed him, that the meeting was in every sense of the word an unqualified success. At the meeting of the British Association at Southport I ventured to say that the members of the Association, and such members of their families as were able to accompany them, would meet with a warm and hearty reception at the hands of the people of Canada. I am glad to know that what I held out as an inducement to go has been fully realised, my Canadian fellow-countrymen being only too happy to have the opportunity of extending the courtesies of the country to so eminent a body of scientists as the members of the British Association; and I am also glad to learn that the fears entertained by those members who at the outset were of opinion that it was foreign to the objects of the Association to engage in what they called a somewhat extended picnic, and that the meeting would not be fraught with advantage to the objects of the Association, have been thoroughly disappointed. It is now admitted on all sides that, even from the special point of view of the Association—the

promotion of science—the meeting was one of the most successful that has been held. While the meeting was not a profitless one to the distinguished members of the Association, I believe that the holding of the gathering in Canada will have a lasting and beneficial effect in stimulating among all classes of the people an increased veneration for science, and an increased desire to promote its cultivation in that important part of her Majesty's dominions. In following the interesting paper contributed by the gallant General, I was a little struck with that part relating to the defence of the country, and I was somewhat surprised that the only allusion he made to that question was that in which he threw some little ridicule upon the maintenance of the great fortress of Quebec as a means of defending the country. In relation to that subject, all I can say is that the people of Canada have not been unmindful of the important duty they owe to themselves and to the country in endeavouring to contribute to the defence of the Dominion. The Government and Parliament of Canada have provided annually a very large sum—especially since the confederation of the Provinces—for the purpose of training and maintaining a body of some 40,000 volunteers and militiamen; in addition, military schools have been organised, and means have been taken for promoting the defence of the country in a still more important way even than direct expenditure for such a purpose could secure. It will, I am sure, be admitted that the strength of the country consists in bringing into the country and promoting the settlement of able-bodied men, and of that duty Canada has not been unmindful. A large public expenditure is annually incurred in bringing into the country men who, in that northern clime, will, I believe, be found ready to cope with a similar number of men in any part of the world. Apart from this, there is no one thing that, perhaps, so contributes to the strength of a country as providing means for the transport of armed bodies of men and munitions of war from one place to another. At the time of the *Trent* affair, in 1862, I remember the great difficulty experienced in throwing a body of troops from Halifax to Montreal; but I am able to state that, as one result of the expenditure of something like £20,000,000 sterling in the past seventeen years by the people of Canada in the construction of the Intercolonial and Canadian Pacific Railways, a force could be transported from the city of Halifax to the shores of the Pacific Ocean at the end of the coming season with infinitely greater ease and less trouble than we encountered in sending a similar body of men from Halifax to

Montreal. Then, again, some fifteen years ago Lord Wolseley was engaged in an arduous struggle to send a British force to the Red River to quell an insignificant rising of half-breeds, who for six months had entire possession of the country, owing to the fact that at the time the place was inaccessible by any other way except through the United States of America, and of course to send a force by that way was impossible. What is the fact to-day? Why, that the force could be sent in an infinitely shorter number of hours than days were consumed in getting across the 400 miles of inaccessible ravine and river. It is true that on that occasion the gallant general acquired the very knowledge and experience that have been found so useful to him in encountering the cataracts of the Nile, and I am right glad to know that, acting with his usual foresight and consideration, he availed himself, not only of that knowledge, but of the services of the Canadian *voyageurs*, whom he had found of such use in his former expedition. I have been led to say these things in consequence of the remarks of the gallant General concerning Quebec, whose defences will, I trust, long be maintained, if only for the purpose of handing down to posterity some visible sign of the gallant deeds done on those heights; and I also wished to point out that we have not been unmindful of the duty of providing for the defence of the country.

Professor T. G. BONNEY, F.R.S.: After the exhaustive and able Paper, and the speeches that have followed, it is hardly necessary for me, as Secretary to the British Association, to make any remarks further than to express my own personal sense of the deep kindness and cordial hospitality received at all sides in Canada. It would have been quite impossible to carry out this visit without the hearty welcome which we got in every quarter. I may, perhaps, be allowed to say that all the time I had to spare from official duty was devoted to the geology and natural features of the country, and I may make a few remarks upon matters which impressed themselves upon my mind while in Canada. The geology of Canada to an Englishman is peculiarly interesting. It exhibits many of the features which we find in the northern part of Britain, with this difference—that a rolling-pin appears to have passed over the face of the country, and the furlongs have been made into leagues. In the extreme east the mineral resources are well known. In the west they are becoming known. There is a very large tract of country which lies to the north of the great lakes, where probably mineral deposits of considerable value will yet be found. I think you will probably find deposits of apatite, of iron ore, possibly

copper ore also, and it may be that metals yet more precious will be found. It appears to me it will be wise on the part of the Government of the Dominion to endeavour to explore as far as possible the mineral resources of the great tract which lies to the north of the St. Lawrence and the north and north-west of the great lakes. I do not wish to be supposed to be offering criticism on the work of the geological survey ; on the contrary, it is hardly possible to speak in words too high of what has already been done ; but I do not think it is possible to carry out this work consistently with the advance of scientific knowledge unless a special department is created for the purpose. It would be a great advantage if the Government were to add to the present staff a band of workers whose special function should be to explore the mineral resources of the country. The other thing which struck me as a traveller is that there is danger lest Canada should imitate the example of young people in living rather too fast, and using up their resources too quickly. You cannot go on using even the fat soils of the West year after year without producing a state of exhaustion at last. It seems to me, further, that there is great waste going on in the Canadian forests. By the liberality and kindness of the Canadian Pacific Railway Company, I was enabled to take a journey into the interior, east of Lake Huron, and I was painfully impressed by the reckless destruction of forests that is going on. It left upon my mind an impression absolutely sorrowful to see the enormous waste of timber. You cannot go on using the gifts of nature in that way without having ultimately to repent of it. I do hope the Canadian Government will make stringent laws for the preservation of the forests. I know that the difficulties in the way are great, and I know the singular obtuseness of Englishmen—the singular objection to be ruled in all matters where they do not exactly see the why and the wherefore. I do, however, hope that these splendid forests, stretching over hundreds and hundreds of square leagues, may be saved from the reckless devastation to which they are too often exposed.

Major P. G. CRAIGIE (Secretary to the Central Chamber of Agriculture) : As one of the visitors to Canada last year, I would re-echo what has been said of the great impressions left on the mind of an Englishman in visiting for the first time our vast possessions in the Dominion. No other impression remains so strong, although I was on the American Continent for some months, as the first one of the immensity of this heritage, which the British nation has only just begun to realise. After listening to the account that has been

given this evening of the Dominion and what happened there last autumn, everyone in this large meeting must, I think, go away with the impression that we ought to do all in our power to make known the great possibilities of the future for the British nation in the full use and colonisation of our possessions which lie on the other side of the Atlantic. With regard to the particular matter which naturally engaged the largest share of my attention—the agricultural resources of the country—I wish first of all to thank the various authorities for their kindness in giving me every possible facility for spying out not only the fatness of the land, but equally the nakedness of the land. The conclusion I came to was very clear and undoubted, viz., that, as you have heard from so high an authority as Dr. Gilbert, the soil of the great North-West of Canada is of remarkable fertility, and, subject only to questions which must affect all countries—viz., prices and cost of production—the agricultural future of the country is assured. Even those districts the fertility of which has often been challenged, those lands which, owing to alkali deposits, have been the subject of complaint—even those lands will, I think, be developed in time. I visited lands in the United States of America which are now covered with homesteads and peopled with settlers, although twenty years ago they had an equally bad reputation. [The Chairman: In what State?] In Illinois. The question of emigration is one in which every Englishman has necessarily a great interest. Of course, the future of Canada will depend in a large measure on the facility with which the settlers adapt themselves to the conditions which are necessary to success. You cannot for ever go on using the soil of the North-West, as in many parts it is now used, as a simple wheat mine. Mixed husbandry must be employed, and more stock must be kept. Nothing impresses the British farmer more than the absence of sheep and the very high price of very inferior mutton. The keeping of a greater amount of stock, a more varied class of farming, and a greater regard for the capacities of the soil, may require larger capital to be invested in agriculture, and the chance of getting this must undoubtedly be among the elements that will have to be taken into account in estimating the rate of future development; but I am sure that, as Englishmen, we can rejoice that so far as the capacity of the soil is concerned the agricultural future of the Dominion is so well assured.

Mr. HECTOR CAMERON (M.P., Canada): As a member of the Legislature of the Dominion, I am glad to have the opportunity of expressing my great gratification at the visit of the British

Association to Canada. It was my good fortune to take a humble and secondary part in bringing about the visit, my friend and connection, Captain Bedford Pim, being the first to propose it. I knew the energy and enthusiasm with which he enters into any undertaking to which he gives his mind, but I hardly believed he would succeed in this. You have heard all about the visit, and there is no need why I should trouble you further on that point. I may mention that, having joined Captain Pim's party at Toronto, I went with him as far as the Rocky Mountains. The Canadian Pacific Railway Company furnished a private car, and we were able to go to the end of the track. I saw Sir James Douglass drive the then last spike of the last rail laid at that time. The scenery of the Rocky Mountains is charming, exceeding in beauty in some parts, I think, the Swiss mountains, and I feel sure that these regions will in the future attract a great many visitors, so wonderful is the scenery to be discovered there. With reference to the fertility of the alkali regions, I visited three or four of the farms experimentally established by the Canadian Pacific Railway, on what were supposed to be alkaline tracts, and I saw there magnificent crops of grain and vegetables. I saw wheat land producing 25 bushels an acre of the finest quality, and raised during the first year of cultivation, the land a few months before having been an utterly wild tract of prairie. That land was supposed to be of inferior quality. I also visited the well-known Bell farm, consisting of some 58,000 acres; about 7,000 acres were under wheat, and one field was producing 80 to 85 bushels an acre. The agricultural machinery was in the highest perfection. At the Sykes Farm, about 20,000 acres, I had an opportunity of seeing what the North-West could really do. Some 18 months before the proprietor took out steam ploughs from this country, and in the first year he had 1,500 acres under wheat. Although he has had many disadvantages to contend with, he was raising 25 bushels an acre. I mention these things to show that a settler in the North-West, with industry and a moderate amount of capital, may within the very first year enter upon a career of prosperity. I do not wish to recommend anyone to go there unless he is prepared to face hard work and difficulties of various kinds, but my experience, extending to a lifetime in Canada, is that an industrious, sober, and self-reliant man never fails to get on. Some do not succeed, but you generally find that some particular fault has led to that result. But with the qualities of which I have spoken success may be regarded as certain, more particularly for the agricultural labourer going to the North-

West. The summer climate of the North-West is more perfectly lovely than that of any country I know in the world. I am told the winters are more enjoyable and delightful than in our part of Canada, and I assure you there is no comparison between the winters here and in Ontario. A more horrible and detestable climate than this I do not know. Give me our Canadian winters, with their dry, rare atmosphere, moderate cold, and the comforts of our houses, rather than the English winter, with the discomforts of your badly-heated houses, and your abominable snow and fogs. In conclusion, I wish to say that as a humble Canadian I have great gratification in expressing my thanks to the British Association for the visit they gave us last year.

Mr. W. TOPLEY (Geological Survey of Eng and Recorder of the Geological Section, British Association): I had the advantage after the Association meeting of visiting the Rocky Mountains with the special excursion, and subsequently Nova Scotia. As regards the North-West I may remark that the lands are of very different qualities—a point not always sufficiently appreciated by writers on this subject. There is the very fertile land of the Red River Valley, which has yielded, and will yet yield, abundant crops for many successive years without rest or manure. Land of the same kind stretches up the valley of the Saskatchewan and Peace rivers. The Canadian Pacific Railway does not go through the most fertile parts of the North-West; these yet await development in the great valleys just mentioned. The soil of the Bell farm fairly represents that of a great part of the prairies; but although crops may be taken from such land without notable diminution of fertility for some years, this cannot go on indefinitely. Major Bell has frankly recognised this, and from the first has arranged to crop the land with wheat, as far as possible, in alternate years. There is great difficulty at present in introducing mixed husbandry, but in place of that the land will be allowed to rest. The phosphate deposits near Ottawa, which I visited, are capable of great development. At present they are worked almost entirely for export to Europe: not much phosphate is used in Canadian agriculture, and this mainly comes from Carolina. The completion of the Canadian Pacific Railway will enable the phosphates to be sent to the North-West without transhipment, and consequently at a cheap rate. I would further remark that, without wishing in any way to depreciate the North-West, in the great future in which I firmly believe, I cannot but feel that the Eastern Provinces of Canada are now in danger of being undervalued, both by Englishmen and by the Canadians.

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themselves. As regards Nova Scotia, I speak from personal knowledge. Well-furnished farms, on excellent land, can now be had at low rates. Many farmers have left the country, and have joined in the rush to the North-West, and there is a despondent feeling in the province, which is certainly not justified. Some of the land in the valleys of Nova Scotia is of the greatest richness and fertility, and over large areas is of high class. This was not my opinion only, but I may state that it was also the opinion of Professors Sheldon and Fream, in whose company I visited the district. There are also here good openings for agricultural and other labourers, with whom there are not the same difficulties as regards winter labour which occur in the North-West. As a geologist I cannot help referring to the splendid sections of the carboniferous rocks at the Joggins, which are celebrated throughout the world.

The CHAIRMAN (the Right Hon. the Marquis of Lorne, K.T., G.C.M.G.): My present duty is to propose a vote of thanks to the lecturer. A short time ago we had the honour and pleasure of welcoming to this country a statesman revered in Canada and honoured throughout the Empire—Sir John Macdonald, who has now completed a term of 40 years of political service. It is not too much to say that Sir Henry Lefroy has known Canadian scientific life for over 40 years; indeed, he may almost be called the father of Canadian science, for it is now, as I am informed, 42 years since he first traversed those great North-Western prairies of which some eloquent and accurate descriptions have been given to-night. I remember there is a gigantic snow-peak in the mountains, which was pointed out as Mount Lefroy, and I did not know at the time after which member of our guest's illustrious family the mountain was called. He went on that occasion as far as the Mackenzie—the great river to the north of the Peace River—a district soon, I hope, to be opened out, and which, I believe, will become as popular with settlers as the Red River of Manitoba. I am sure you will all agree with me that Sir Henry Lefroy thoroughly deserves our thanks. I gather from what he said to-night that he is somewhat critical on the wording of votes of thanks, and so I thank him for his "important and interesting paper on this subject," as well as for his paper on this "important and interesting subject." I would only say one word in a hostile spirit, and that is with regard to the defences of the ancient fortress of Quebec. It is rather hard, after employing our best energies with an economical Government—a justly economical Government—to have those ancient walls kept up, to find a distinguished officer of the British army telling us we

should knock them down ; but we do not wish that this fortress, so recently repaired, should ever be required for defensive purposes, except in the sense mentioned by Sir Charles Tupper, viz., increasing the resources of the country by attracting people to it. I am glad to hear such a great concurrence of testimony as to the success of the meeting at Montreal. When the question was first mooted, I thought that, knowing how difficult John Bull was to persuade and move, it would be a tough job to bring him over. However, with a strong pull, a long pull, and a pull all together, the effort was successful. I remember that one of the keenest in making the first overtures was my friend Bishop Lewis, of Ontario, and after some opposition from members of the Association, and also from influential members of the Press, the meeting was brought about. I hope the visit is one which will be repeated, not only in Canada, but also in Australia. It might be too much to ask the members of the Association to go to India. They might, perhaps, be of opinion that in Canada and in Australia they might enlarge their minds, and that they would only go to India to enlarge their livers. Still, we may live to see the meeting of the Association held in Calcutta or in Bombay. Some observations made this evening have been of especial value. It has always been rather an uphill task to persuade the Canadian House of Commons how important are the geological surveys, and I welcome the expression of opinion, on the part of a prominent officer of the British Association, that with such an enormous country considerable expense is necessary in order to fully elucidate the mineral resources of Canada. I hope Professor Bonney's words will be borne in mind in Canada. With regard to the conservation of forests, we must not wholly lay the blame upon the Government for the destruction that is going on, because the forests are in the hands not of the Federal Government but of the Provincial Governments. With regard to the Province of Ontario a great deal has been done, and on the right lines, to induce a more scientific cultivation of the land, in the foundation of such excellent colleges as the Guelph Agricultural College. I am sure you will be glad to join me in this vote of thanks, and say that if in future any British Government neglects the interests of the Colonies the British Association may be expected to lead the revolt, and overthrow such persons as no longer worthy of their places.

The motion was passed with acclamation.

General Sir J. HENRY LEFROY, K.C.M.G., C.B. : I beg to return to you my grateful thanks for the cordial manner in which my Paper has been received. I feel sure that every member of the meeting

will give me plenary absolution, and even a vote of thanks, for not accepting Sir Charles Tupper's invitation, and entering into the question of the defences of Canada. I don't know where we should have been now if I had gone into that subject. I am sorry that my remarks should have been regarded as disrespectful to the fortress of Quebec. I said nothing of the modern defences on the Point Levis side, or of that noble citadel which guards the British flag, and stands, a grey sentinel, witnessing to two centuries of history. All I intended to say was that there are some portions of the old works of Quebec which subserve no useful purpose of modern defence, and are very much in the way of improvement, and that the armament is obsolete.

Mr. FREDERICK YOUNG : It is no part of the ordinary programme of the Institute that a vote of thanks should always be proposed to the chairman of the evening, but I am sure we shall not be willing to separate without giving our most hearty thanks to the noble Marquis who has presided on this occasion. To my mind, it is impossible to exaggerate the value and importance of gentlemen in the position of the noble Marquis coming to our meetings and taking a prominent part in our proceedings. I myself feel particularly grateful to our noble chairman for the kind and genial way in which he responded to my request that he would preside this evening. It seemed specially appropriate that when we were discussing a subject relating to Canada, the late Governor-General should preside. I beg to propose that our heartiest thanks be given to the Marquis of Lorne.

The motion was cordially adopted.

